SIEMENS

Mobility Division

Background Information

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Enhanced passenger experience trough digitalization

Simply getting quickly and efficiently from A to B is taken for granted nowadays, but passengers expect more. Towns, transport companies and industry have to respond to this situation. The challenges are complex: What is the quickest route? How can the various means of transport be combined with one another? What is the cheapest ticket for my journey? No compatible tickets; low-cost, long-distance buses competing with long-distance trains; new mobility service providers and car sharing etc., competing with public transport; non-optimized connections between local and long-distance transportation; a lot of traffic caused by the search for parking spaces in towns; rarely available real-time information about delays and connections – these are all enormous challenges.

Digitization will revolutionize the way we move around. A recent study estimates that the markets for "shared mobility" – that is car sharing, ride sharing, bike sharing and shared parking – will rise to more than 18 billion euros by 2020. These new mobility services need to be digitally networked with traditional services – such as rail travel, urban transport and private transport – in order to offer passengers the optimal solution in the form of mixed modes of transport. The ubiquitous Internet and mobile devices are driving up the expectations placed upon services, and the data exchange between the various means of transport offers new opportunities and business models for rail operators and mobility service providers. Innovative technologies make all this possible.

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SiMobility Connect provides information about the available transport options and assists multimodal journey planning and booking

SiMobility Connect is a B2B platform that enables information and transaction services to be offered across various means of transport. The platform provides system interfaces for transport operators and mobility service providers as well as integrated processes such as real-time passenger information, options for multimodal journey planning, booking, ticket purchase and payment. The means of transport covered can include not only public transport (railways, ferries, cable cars, etc.) but also private transport such as car sharing, bike sharing and taxis. The real-time optimization of routes can also include up-to-date traffic information. Apps and portals accommodated on the B2B platform enable the services offered to passengers to be adapted to match individual user profiles. The ease of using various carriers affects the split between modes and reduces inhibitions about using public transport.

Components of the Siemens solutions are in use, for example, for the online live card of the Verkehrsverbund Berlin-Brandenburg (VBB, Berlin-Brandenburg Transport Association). These are complemented by inter- and multimodal information. SiMobility Connect also provides mobility information about German cities – including transport options and real-time timetables – for a corporate travel app used for business trips. Plans are in place to add further towns and functions to the app. The development of a sales platform for the South-Eastern Railway in Switzerland (Schweizerische Südostbahn) also uses elements of SiMobility Connect.

SiMobility Flow provides location-related information about transport and related needs

This solution is mainly based on the proactive provision of location-related services for passengers along their routes, in stations, at bus stops, and in vehicles, buses and trains. The smartphone app detects nearby Bluetooth transmitters, so-called beacons. When travelers stay near the transmitter, companies can send push messages via the mobile app. Depending on the individual settings, the mobile device provides information about transport options, tourist information or marketing messages. For example, when passengers enter the infrastructure, they automatically receive push notifications about departure times, service disruptions and other relevant events. Updated timetables are displayed as soon as the

passenger reaches the platform. In the same way connections to other carriers are shown when he reaches the destination platform. On leaving the station, attention is drawn, for example, to car sharing and bike sharing stations, as well as to shops.

Evaluating the data reveals passenger flow patterns. This data enables transport undertakings to optimize their infrastructure and services. The data analysis generates anonymized transportation data from the actual passenger behavior. Passenger movements are not monitored by GPS and strict protection of personal data is enshured. For example, SiMobility Flow is being used in a pilot project in the Villach Region of Austria, where it is complementing transport-relevant content with additional tourist information. Current implementations in London (The Crystal) and Abu Dhabi (Masdar City) are also showing the value added by combining mobility-related content with complementary locality-related content.

SiMobility JustGo: contactless ticketing with the best possible fare

One main application is the "Be-in/Be-out" (BiBo) ticketing. A smart phone with the BiBo app detects installed, bluetooth low-energy transmitters (beacons) while the vehicle is running and sends the data to the backend for processing the data regarding the route taken. Billing takes place on the basis of usage after the route has been traveled, and the cheapest fare is automatically applied in each case. Advantages: No need to purchase individual tickets, no aggravation with vending machines, no knowledge of tariffs necessary, no barriers, no check-in or check-out. The system supports all public carriers: buses, trams and trains. Siemens also offers combined solutions for ticket purchase, such as CiBo (Check-in/Be-out).

Siemens was chosen to be the business partner for the development, introduction and operation of a sales platform for the Schweizerische Südostbahn AG (Swiss South-Eastern Railway), which is scheduled to come into operation at the end of 2016. The system offers the BiBo range of functions via a smartphone app and a module that calculates the cheapest fare after the journey has been completed. This includes easy access to intermodal mobility services, including route guidance as well as static and dynamic timetables.

Passenger assistance systems providing all relevant information during a journey

The mobile passenger assistance system supports the passenger throughout his journey and delivers appropriate information about the status of his journey while he

is on the train. The system consists of individual modules, which the transport company can configure for individual passengers. The system is based on an information module called a passenger portal. It offers current information – relevant to the location – about upcoming stations, possible delays, and also includes possible alternative routes and information about places of interest. Furthermore, all services can be called, for example, regarding the location of the bistro or special baggage compartments on the train. A passenger can use the navigation module to guide him to his reserved seat, the nearest empty seat, a car with empty seats, or the bistro. The "Internet on board/Wifi" module can bring together all the communication channels available on the route, such as mobile telephony, stationary Internet and satellite channels. The "Entertainment" module can be used to call from a server on the train a range of films, games and digital newspapers selected by the transport company. A passenger can order and pay for food and drink, and have it brought to his seat with the "Order from the bistro" module in the same way as from an online shop. From his seat, a passenger can use the Chat module at any time during the journey to contact the train attendant or a customer service center to obtain information about his journey or report defects.

Passenger assistance systems are available, for example, on the Velaro Turkey and Velaro Eurostar high-speed trains as well as on Thameslink and South West Trains regional services.

Real-time route planning and dynamic information for on-train screens: Passenger Information System plus

On modern, high resolution, on-train screens, the dynamic passenger information and control system informs passengers on the train about alternative travel options, connections, etc. in the event of delays, cancellations and disruptions. It supplies travelers with important information about the transportation system and makes it easy for the passenger to localize complex network plans and infrastructure facilities, such as escalators and elevators. This puts the transport company in a better position to control, guide and speed up passenger flows.

Conventional passenger information systems work with simple, static plans of the transport company network and use symbols to display the position of the train, connection options without transfer times, and simple line names. They do not show the passenger combined real-time information about the infrastructure and vehicles such as current disturbances in the transport network as a whole or on the train

itself, or on other lines, door malfunctions, event hot spots, escalator and elevator failures in a station or the associated delays. A dynamic passenger information system is integrated into the transport company's control center and can not only ensure the interactions between the displayed content and the location of the train in the network, but can also identify the display in the train on which the information has to be shown. This is because the displayed connection information is generated for each door and station environment, and the transfer options, including waiting times, infrastructure closures, diversions etc., are shown in the passenger information display.

Safety on the train and passenger comfort improved by intelligent closed circuit television (iCCTV)

An intelligent system for optimizing capacity utilization enables the passenger to be shown the occupancy of a car in an app. This enables him to see where seats, standing areas and bicycle spaces are free both before the train arrives as well as during the journey. A transport company can measure the capacity utilization on its trains in real time and can adjust capacities to match demand or it can inform and guide travelers. It can use downstream data analysis to optimize its future transport capacities and improve the utilization of its trains.

The transport company can use a system that increases passenger safety by detecting aggression and vandalism at an early stage.
An anonymous image and audio analysis attempts to identify potential threats to passengers and vandalism in real time during the trip, so that train and security personnel or the control center can be informed immediately. Whereas conventional security surveillance systems merely record the data, with this system the transport company can react immediately and better protect passengers and trains. This reduces maintenance costs by preventing damage or at least limiting its extent by detecting vandalism at an earlier stage.

Train IT – the technical basis for more passenger comfort

Rigorously separating the train control level functions, which are subject to homologation, from the train operator and passengers level functions (Train IT) gives the opportunity to utilize IT standards for hardware and software in Train IT level functions. As a result, costs can be significantly reduced, not only for the initial provision but also throughout the entire lifecycle of the train. Furthermore, modifications and extensions can follow the typically fast IT innovation cycles, which

had previously been prevented by the lack of standardization, but above all by the extensive homologation procedure on the train control level.

Train IT is a modular, fully integrated system for IT applications in rail vehicles. It includes standard hardware with standard IT interfaces as well as the software based on those standards to provide a wide range of solutions for train attendants and passengers. These include passenger information systems, CCTV systems, passenger counting solutions, entertainment systems, diagnostics, maintenance and much more. It also offers a standardized train/ground connection, via which, for example, the current position and speed of the train is reported to ground-based systems and thus can be used in other applications such as fleet monitoring. This standardization also enables extensive expandability and scalability.

Among other things, Train IT replaces the widespread proprietary individual systems currently used on rail vehicles, which are only integrated poorly and at great expense, and are difficult to expand. For example, each of these old systems uses a proprietary network, which means that more hardware (cables, switches, separate computers) has to be installed. For those proprietary systems quite often obsolescence issues a difficult to handle, because the respective hardware is typically not subject to the usual IT product lifecycle, which includes upwardly compatible new devices. Functions such as the current position and speed of the train are difficult to implement because each type of vehicle has a different interface to the train-to-ground systems. Software maintenance in those legacy systems can often only be done manually with the aid of a USB stick.

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Siemens AG (Berlin and Munich) is a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability and internationality for more than 165 years. The company is active in more than 200 countries, focusing on the areas of electrification, automation and digitalization. One of the world's largest producers of energy-efficient, resource-saving technologies, Siemens is No. 1 in offshore wind turbine construction, a leading supplier of gas and steam turbines for power generation, a major provider of power transmission solutions and a pioneer in infrastructure solutions as well as automation, drive and software solutions for industry. The company is also a leading provider of medical imaging equipment – such as computed tomography and magnetic resonance imaging systems – and a leader in laboratory diagnostics as well as clinical IT. In fiscal 2015, which ended on September 30, 2015, Siemens generated revenue of €75.6 billion and net income of €7.4 billion. At the end of September 2015, the company had around 348,000 employees worldwide. Further information is available on the Internet at www.siemens.com